Tumescent Liposuction
&
Tumescent Lidocaine Anesthesia

Practical tips, tricks, & pearls

Jeffrey Klein, MD
jeff@kleinmd.com

Hips, Outer Thighs & Buttocks
2 Month F/U

Today's Topics
Tumescent Lidocaine Anesthesia (TLA)

- Tumescent Liposuction: Simple, Safe, Effective
- TLA Delivery Techniques
- Recommended Maximum Safe mg/kg
- Novel TLA Applications
  - Non-Liposuction Procedures
  - Tumescent Antibiotic Delivery
  - Tumescent Thromboprophylaxis

Financial Disclosure

- liposuction101.com

  (Hand-on Tumescent Liposuction Course)

- hksurgical.com

  Tumescent Delivery Devices/Supplies

Tumescent Infiltration Pump
Circa 2002

Digital Tumescent Infiltration Pump
Circa 2014

Digital Tumescent Peristaltic Pump

- Precise Rate of Infiltration (ml/min)
- On-Off Modes: Swithch Selection
  - Toggle Switch (Light Switch)
  - Persistent (Pressure-On) Switch
  - Trigger Switch (Predefined Volume)
- Actuator Location
  - Remote Foot Pedal
  - Control Panel
  - Remote Hand-Held Sterile Disposable

Hips, Outer Thighs, & Buttocks
2 Month F/U

Tumescent Safety Tips

1) Amount of lidocaine per bag of tumescent lidocaine solution specified in terms of "mg per bag" rather than "(ml) x (% concentration)".
2) IV fluids are relatively contraindicated
3) TLA mixed in the OR immediately pre-op
4) Avoid drug inhibitors of

   CYP1A2 fluvoxamine, ciprofloxacin

   CYP3A4 sertraline, erythromycin, ketoconazole, amiodarone

5) **Clonidine** 0.1mg & **Lorazepam** 1mg PO, A**tropine** 0.4mg IV/IM
6) **Infiltration Cannulas**: blunt-tipped multi-orifice

NOT for IV use

Tumescent Local Anesthesia

Only for Subcutaneous Infiltration

Bag# _____

Lidocaine (mg/L): _____

Epinephrine (mg/L): _____

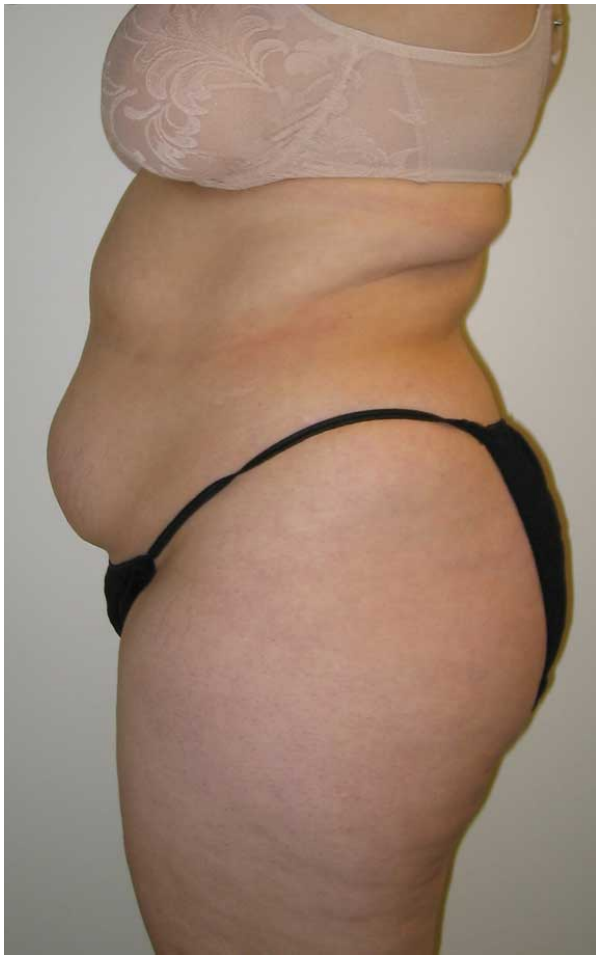
Na-Bicarb 10mEq/L 0.9% NaCL Lactated Ringer's

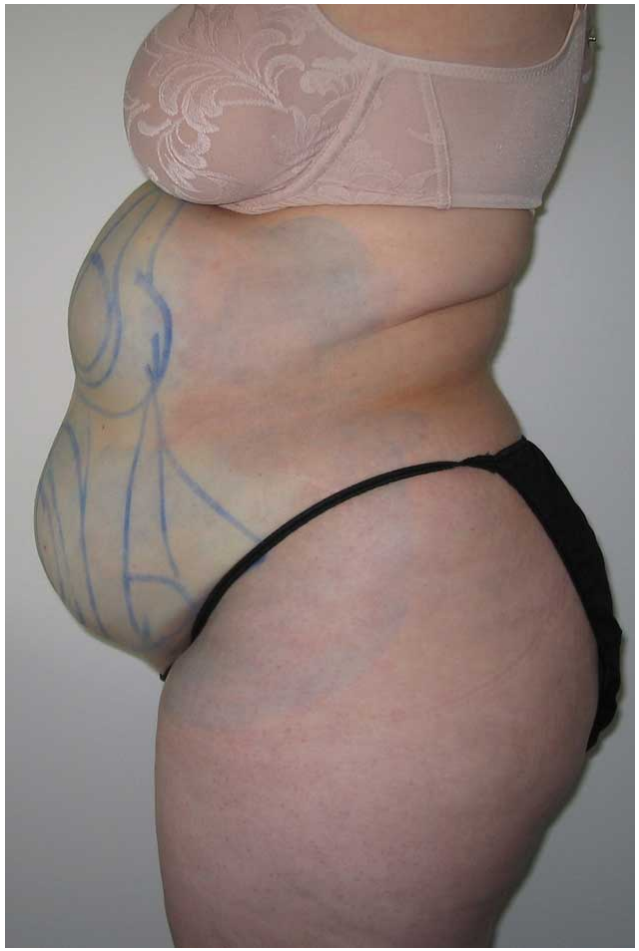
Pt. Name: _____ Date:

Adhesive-backed safety labels www.HKSurgical.Com 800-909-0060

Avoid giving a tumescent solution by IV infusion

Pre-Op, Tumescent, 1 Day Post-Op





Tumescent Liposuction & Open Drainage

Pre-Op

Tumescent

Post-Op

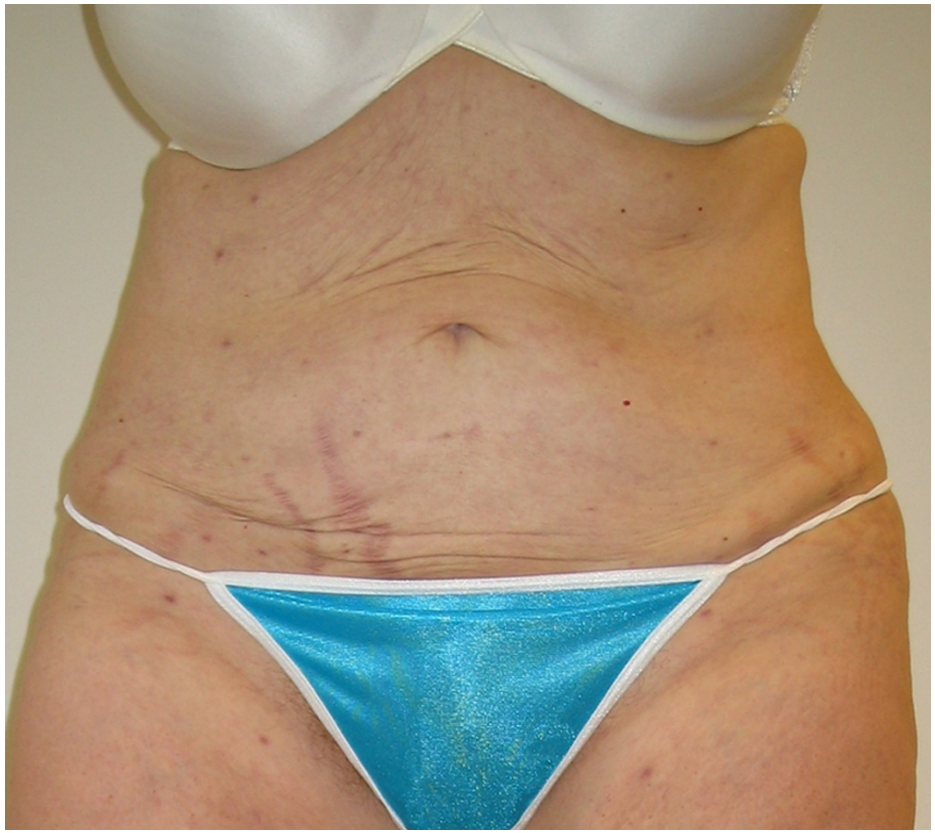
2600 ml Supranatant Fat

Open Drainage Reduces Echymoses

Before

1 Day After

Open Drainage Reduces Echymoses



Infiltration Techniques

- Without Sedation
  - Sharp-Tipped (multiple 20gauge needles)
  - Combination
    - 20gauge Spinal Needle (<10%)
    - Blunt-Tipped Infiltrators (>90%)
- Heavy Sedation or General Anesthesia
  - Large Diameter, Rapid, High Volume
  - Little Skill & Rather Painful

Sharp Needle Infiltration Techniques

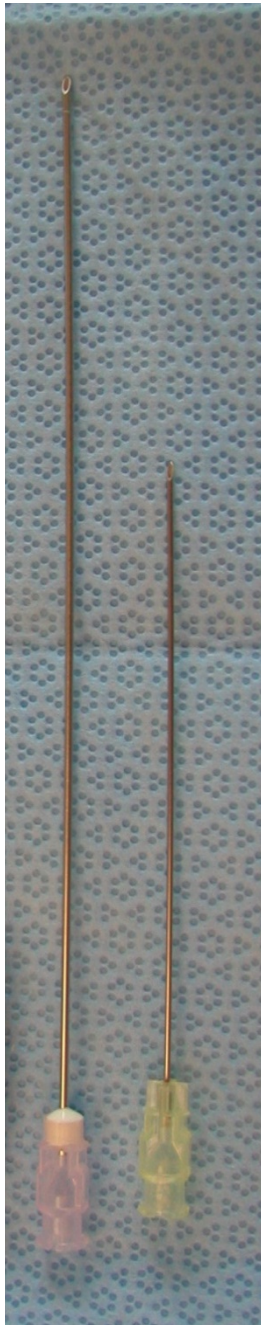
- Single Needle
- Multiple 20g Needles with Manifold
- Sharp-Injury Complications

  Pneumothorax

  Intra-Abdominal Injury/Laceration

  Intra-Vascular Delivery

  Staff Injury Needle Puncture
- Not Appropriate without Supervision

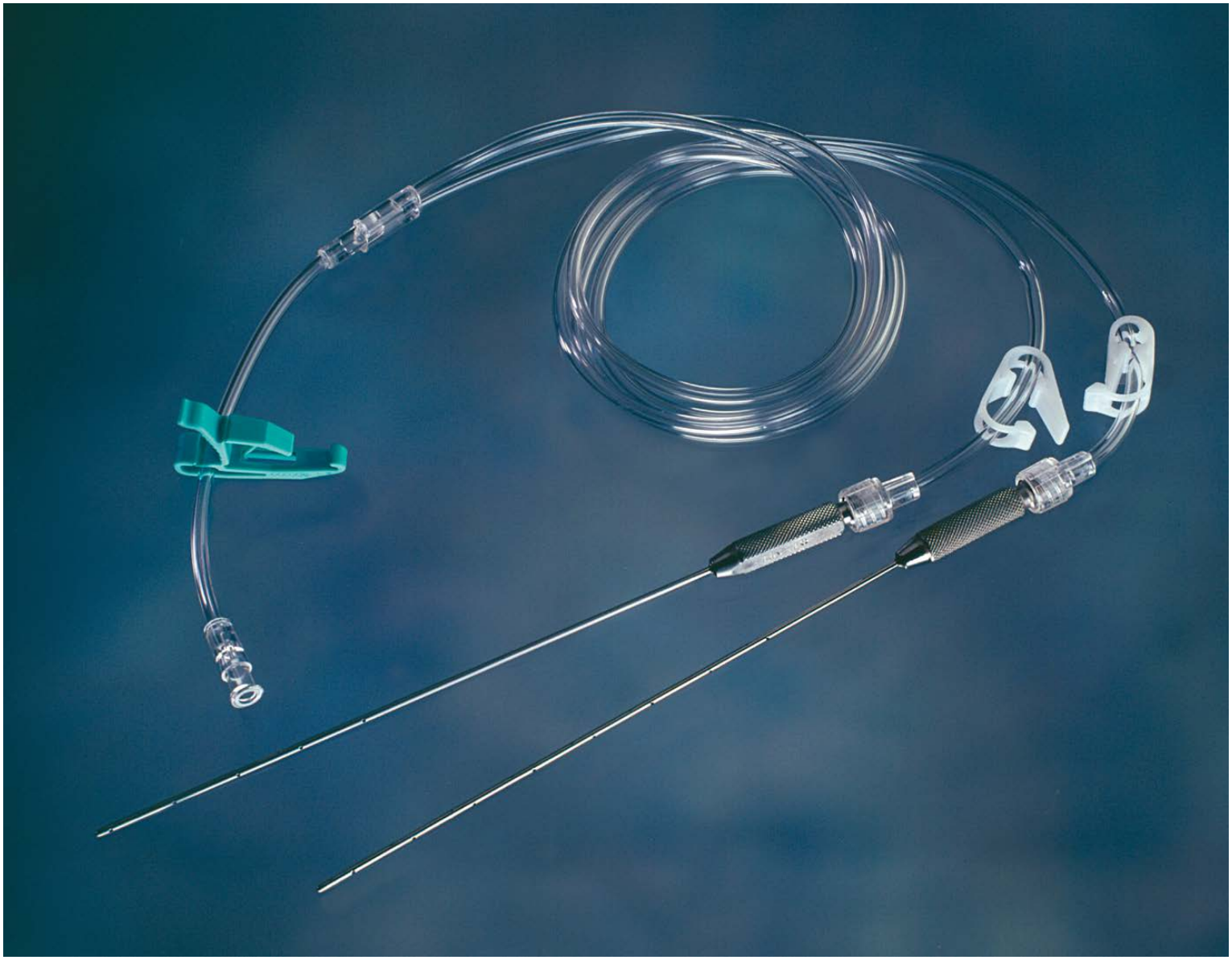


Monty Infiltration Cannulas: Full, Half & Tips

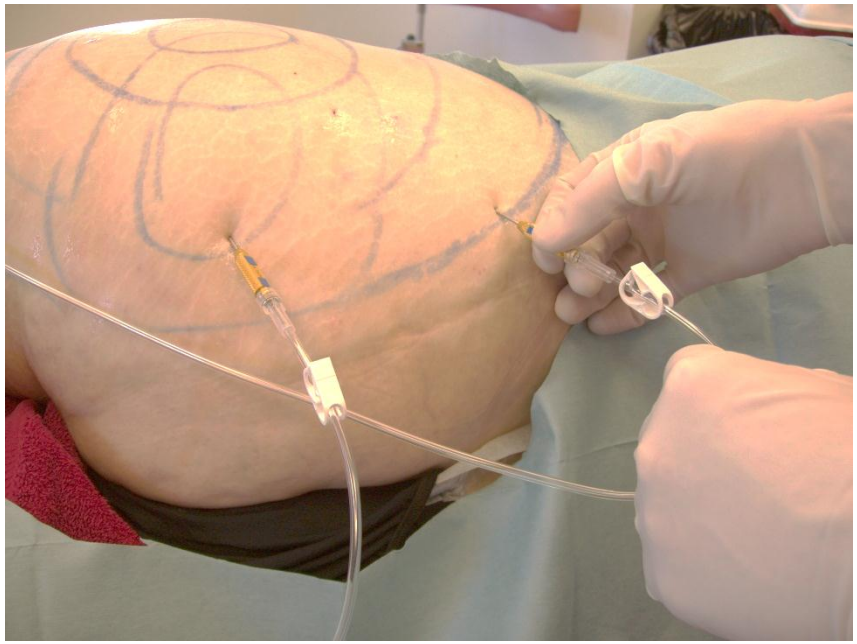
Blunt-Tipped Infiltration

- 1 or 2 Cannulas
- Subcutaneous Access
  - Adits (1mm to 2mm Punch)
  - Sharp Slit
- Safer in hands of "The Least Safe"
- With or Without General Anesthesia

Y-Extension Tubing

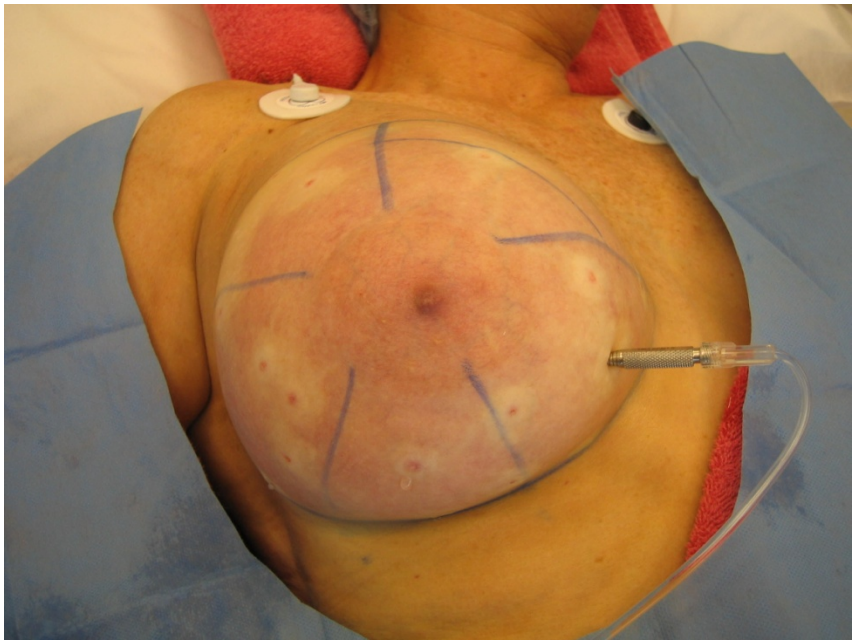


Simultaneous Monty Infiltrators



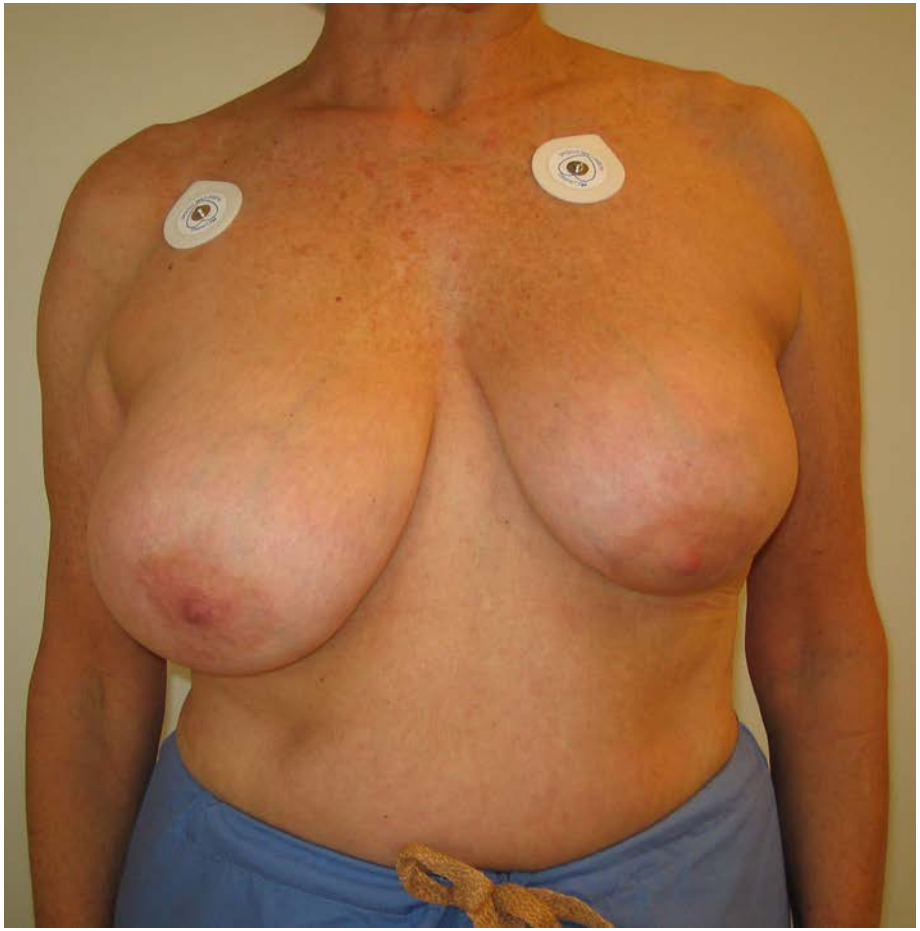
Before & After Liposuction

Tumescent Infiltration

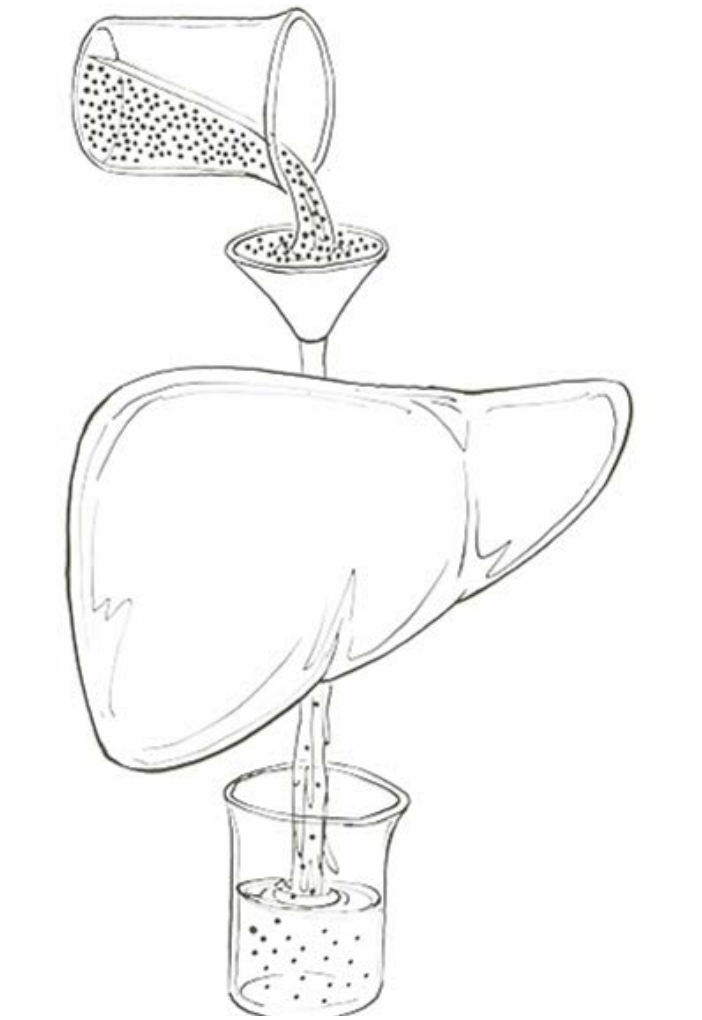


~1200
~1000
~800
~600
~400
~200
ml
~100
~300
~500
~700
~900
~1100
Medi-Vac is a registered trademark and CRD is a trademark of Cardinal Health Inc. or one of its subsidiaries.
Cardinal Health
McGaw Park, IL 60085 USA

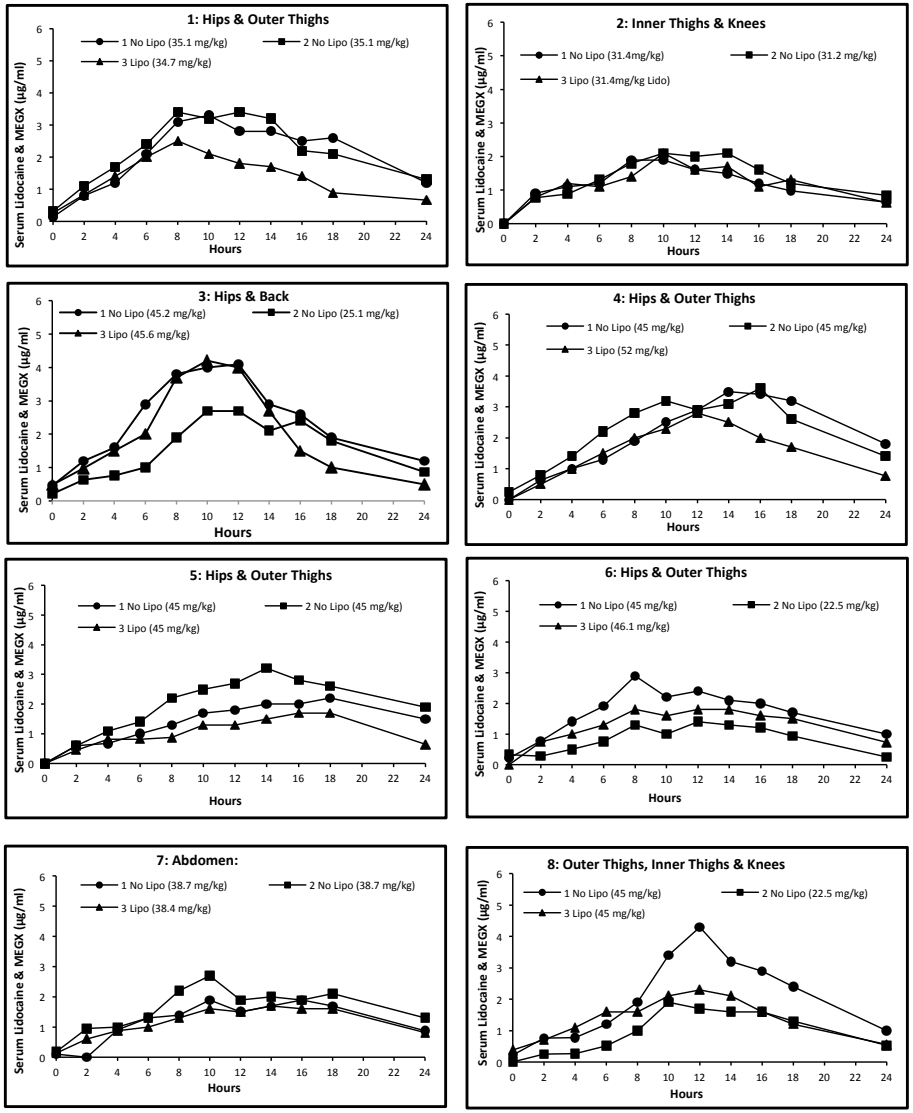
Asymmetry as the Result of Cancer Lumpectomy Left Breast



Safety of High TLA Dosages: Rapid Metabolism & Slow Absorption



Slow Systemic Absorption



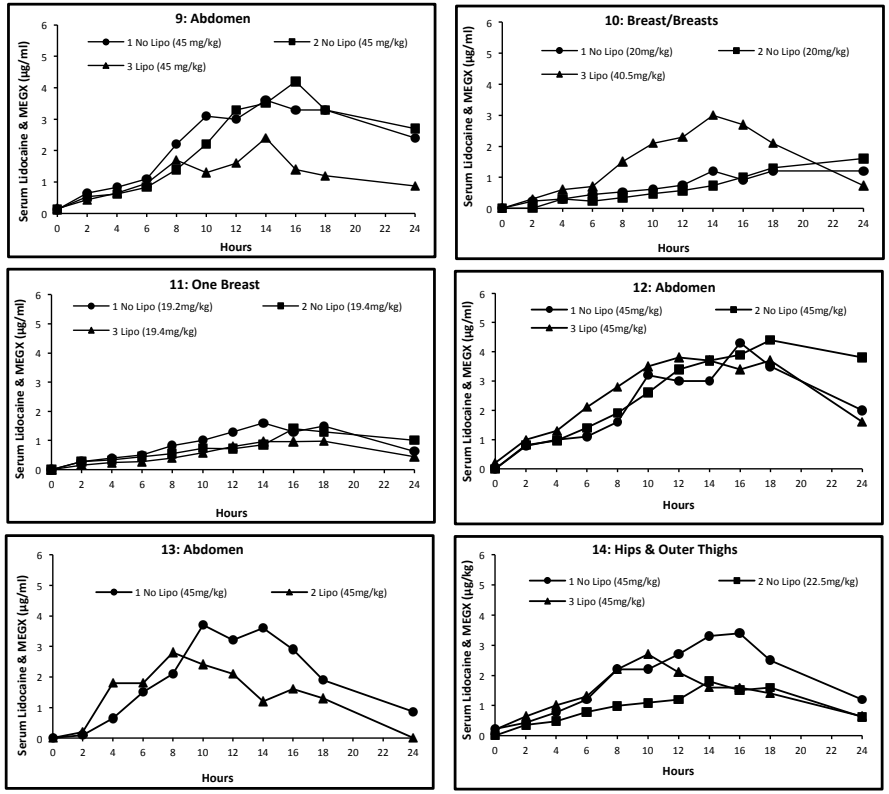
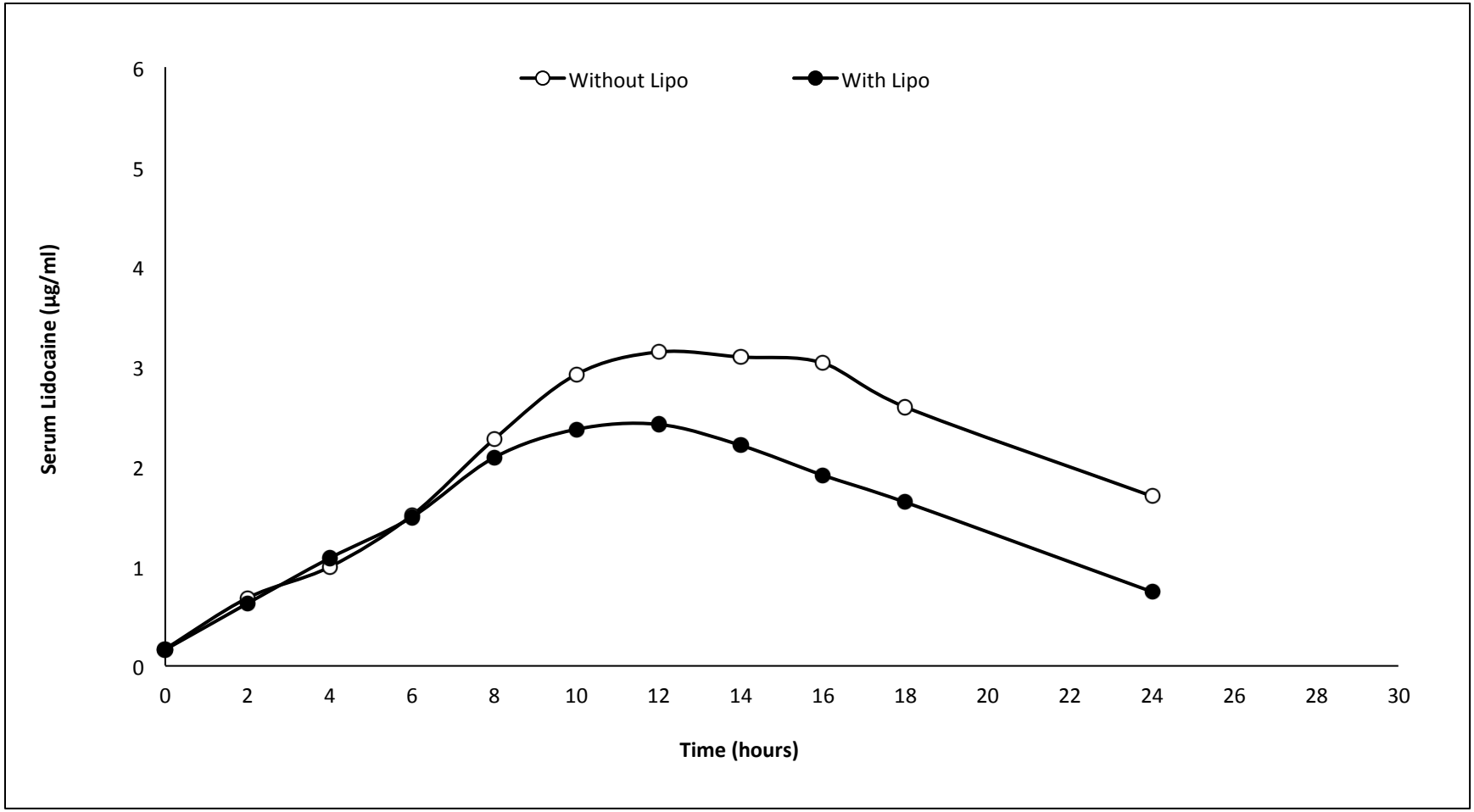


Figure 1. Graphs of serum lidocaine concentration-time profiles for each of 14 subjects following subcutaneous infiltration of tumescent lidocaine anesthesia (TLA). The legends indicate the Subject #, anatomic area of infiltration, whether or not liposuction was done after tumescent infiltration and the mg/kg dosage of tumescent lidocaine.

Two Months Postop

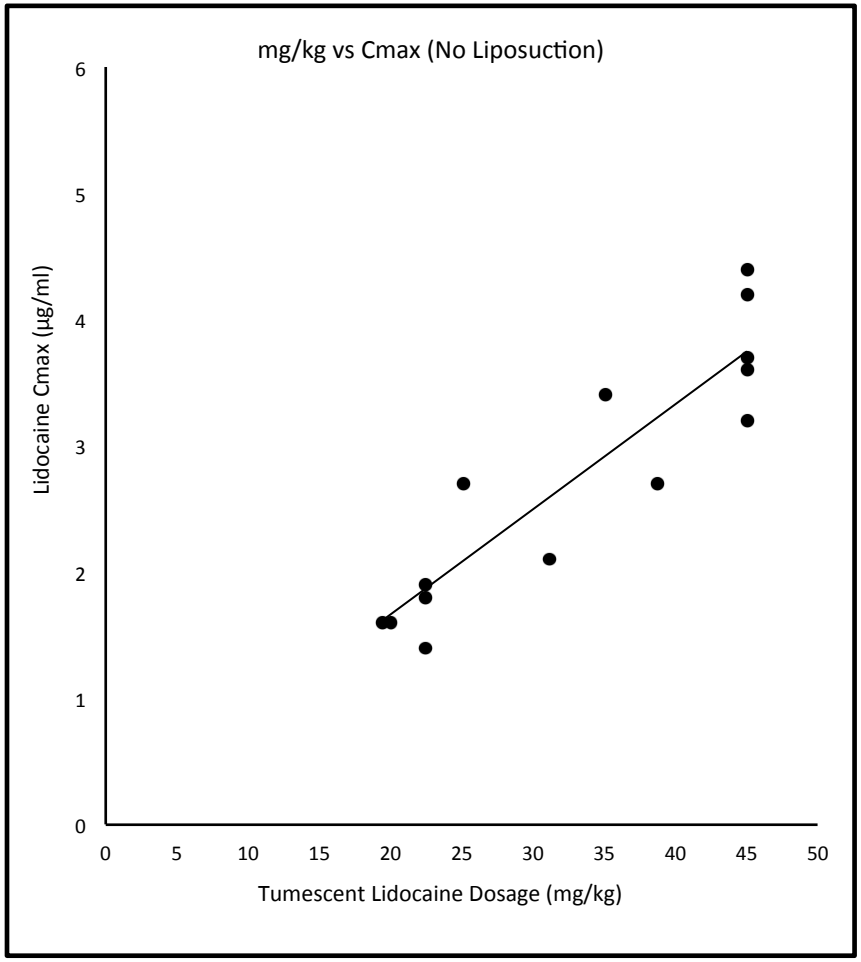
Liposuction Removes 28% of Lidocaine

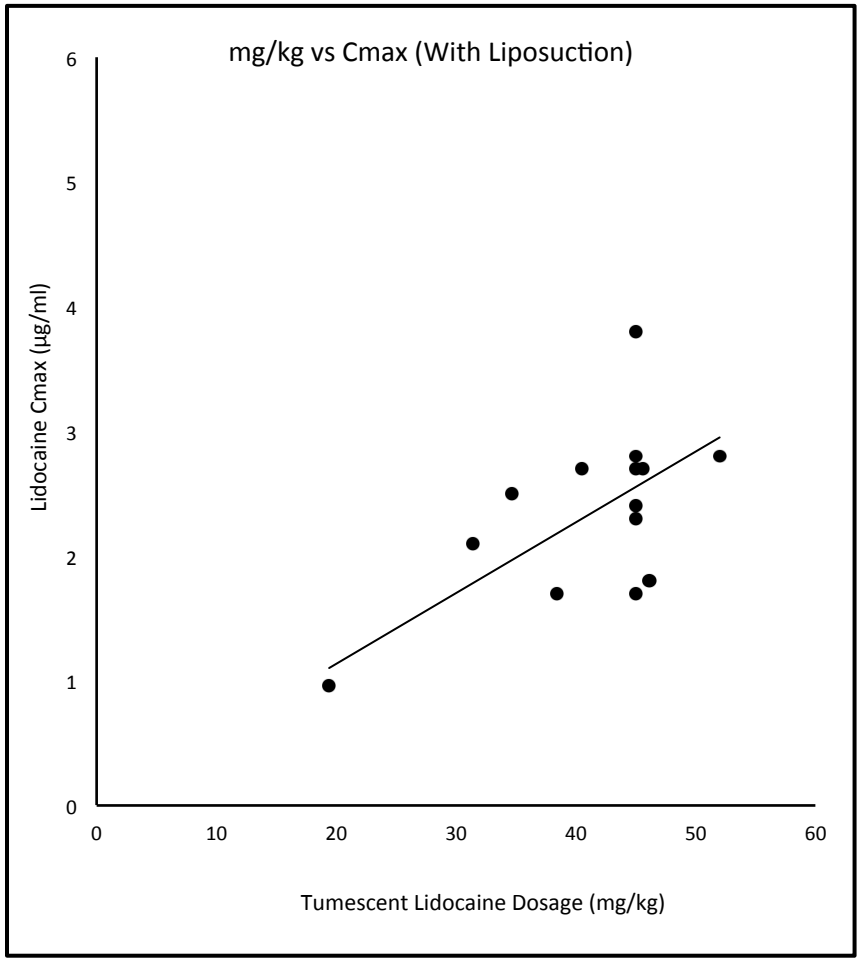
Mean Concentration: 45mg/kg



Correlation: Coefficient of Determination

R^2 = **0.77 w/o Lipo**, R^2 = **0.35 w Lipo**





Tolerance Interval Analysis

At 99% Assurance

The Probability of Serum Lidocaine > 6µg/ml

	Dosage of Tumescent Lidocaine (mg/kg)						
	21	28	35	40	45	50	55
No Liposuction	$< 1/10^{16}$	$1/5x10^{6}$	1/10,000	1/750	1/80	1/15	1/4
With Liposuction	$1/5x10^{10}$	$1/2x10^{7}$	$1/2x10^{5}$	1/15,000	1/2,000	1/500	1/100

Tolerance Interval Analysis:
Predicts **Maximum Safe Dosage**

- **28mg/kg Without Liposuction**
- **45mg/kg With Liposuction**

Novel TLA Applications

- Facelifts
- Endo-Venous Laser Ablation (Leg Veins)
- Large Dermatologic Surgery (Melanoma, etc)
- Burn Patient Skin Graft
- Mastectomy
- Vascular Surgery
- **Tumescent Antibiotic Delivery (TAD)**

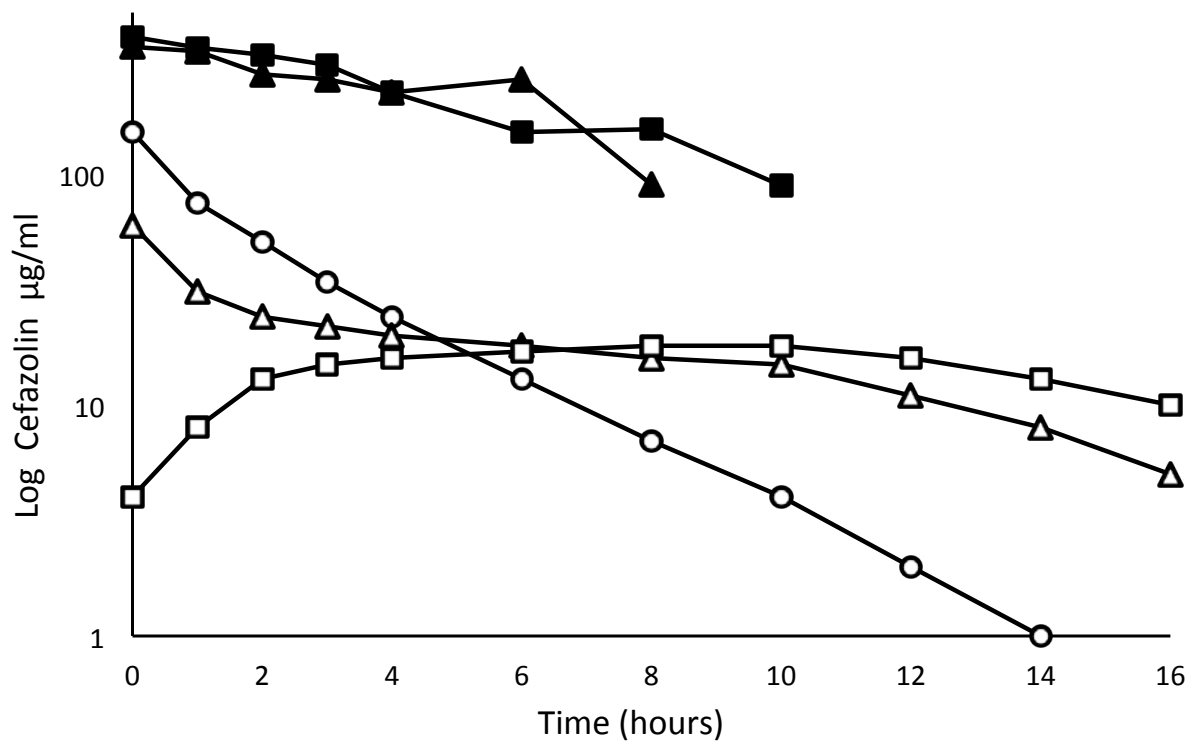
Tumescent Antibiotic Delivery for SSI Prophylaxis?

- **1000 mg Cefazolin + 500 mg Metronidazole in each Liter of TLA.**
- **IV Ancef**
- Delivered by RN or MD

TAD: Tumescent Antibiotic Delivery
TAD vs TAD+IVAD vs TAD

Figure 5A: Cefazolin, Abdom

Cefazolin Marker	Tissue Sampled	Mode of Delivery	TAD (mg/L) Solution	LTAD Dose (mg)	IVAD (mg) Dose	Cmax (µg/ml)	AUC (µg-hr/ml)
Closed Square	TISF	TAD	345	1200	—	394	2484
Closed Triangle	TISF	TAD + IVAD	400	800	400	354	2977
Open Circle	serum	IVAD	—	—	1200	152	325
Open Square	serum	TAD	345	1200	—	18	144
Open Triangle	serum	TAD + IVAD	400	800	400	60	300.5



Tumescent Thromboprophylaxis?

- Measure Bleeding Volume (BV)
- Pre-TLA vs Post-Lipo by paired t-test
- Significant Increased Bleeding Volume
- Implies ↓ Platelet Aggregation
  - No Change in Platelet Count
  - Significant ↑ Neutrophils